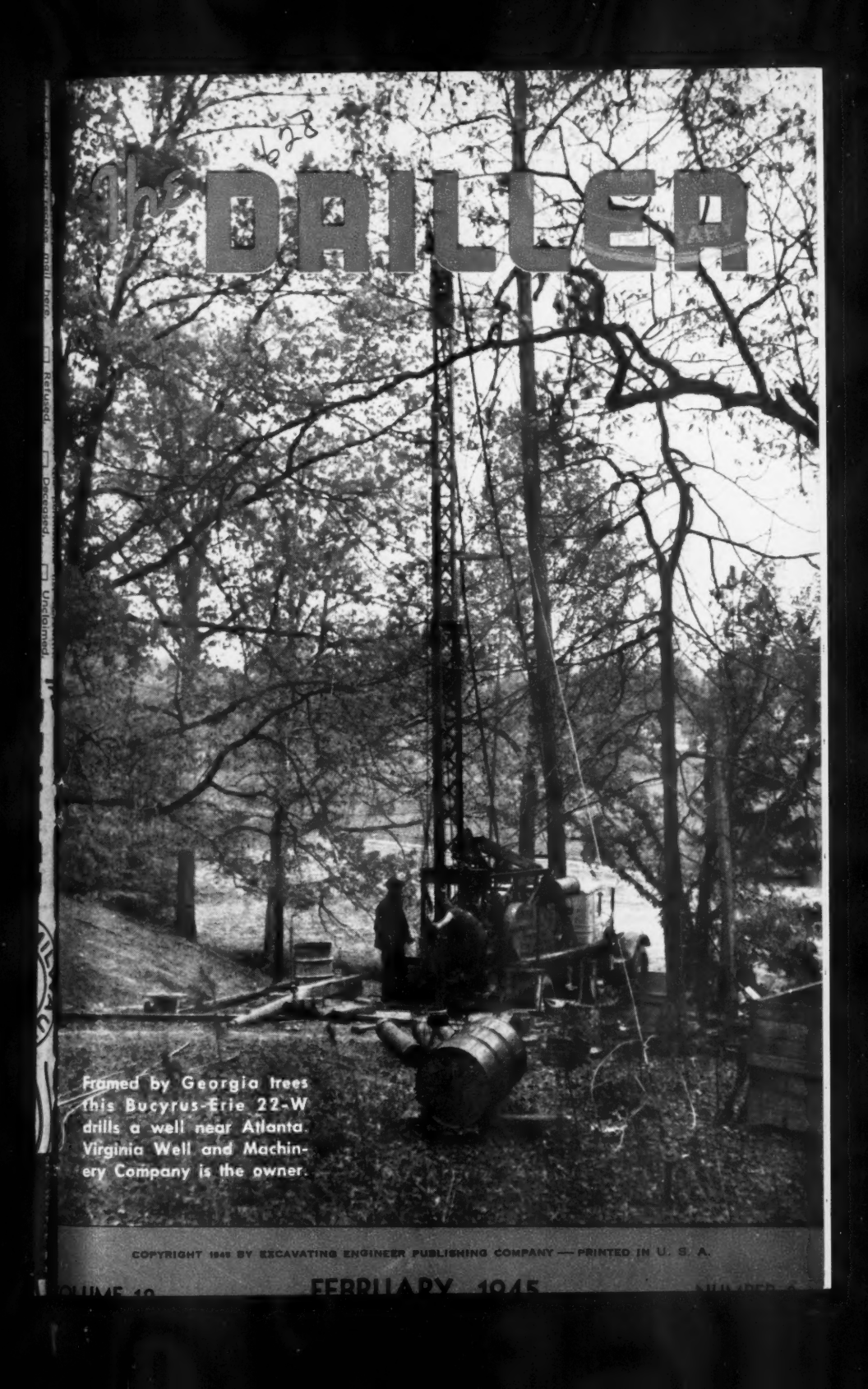


Framed by Georgia trees this Bucyrus-Erie 22-W drills a well near Atlanta. Virginia Well and Machinery Company is the owner.

COPYRIGHT 1945 BY EXCAVATING ENGINEER PUBLISHING COMPANY — PRINTED IN U. S. A.

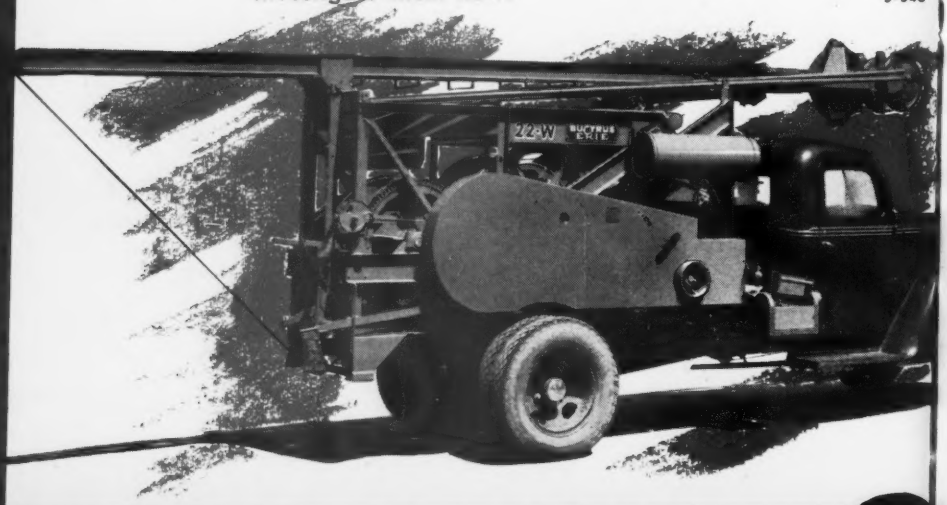
VOLUME 10 FEBRUARY 1945 NUMBER 6

EXPAND YOUR TERRITORY

with Bucyrus-Erie Drills

"The more square miles in my territory, the more potential customers I'll have, and the better chance for profits" . . . When a driller tells you that, he's talking sense — if he has the equipment to handle a large territory efficiently. It takes modern, fast-moving and fast-working equipment to do it. When **both** moving and drilling time are cut to a minimum, it's a cinch that you can drill more wells and bring in greater profits. That's why it will pay you to plan your post-Victory expansion with Bucyrus-Erie truck-mounted or truck-drawn drills — machines that shrink distance on the road and speed footage on the job. Investigate them now!

J-94C



BUCYRUS-ERIE CO.

628.11
3

Leadership in CONSUMER ACCEPTANCE

A MESSAGE TO MYERS DEALERS:

Another Reason WHY MORE MYERS WATER SYSTEMS ARE IN USE THAN ANY OTHER MAKE

No other water system enjoys such complete consumer acceptance. It is a basic Myers policy to continually remind people of Myers Water Systems through National Advertising. Over the years, Myers has been the most consistent national advertiser in this field. You can depend on Myers to keep alive this valuable public acceptance through continuous national advertising which reaches a large majority of water system prospects in your territory.

TAKE OFF YOUR HAT TO MYERS PUMPS and WATER SYSTEMS

THE F. E. MYERS & BRO. CO.
Dept. C-50, Ashland, Ohio

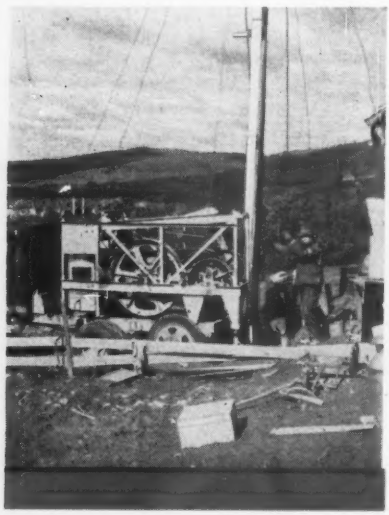
Gasoline in Well Brings Hurry Call to Spicer

Around Johnson City, New York, it's the usual thing to refer well problems to H. A. Spicer. Among his many drilling experiences was the recent puzzle involving a well from which gasoline was pumped. The answer was simple—and illustrates the importance of good well construction.

"MR. SPICER? How soon can you take a look at my well? There's something radically wrong with it, because it's been pumping gasoline—125 gallons of it!"

This is the gist of a telephone call received recently by H. A. Spicer, drilling contractor of Johnson City, New York; you can imagine his amazement and that he lost no time in "taking a look."

• This Spicer job was located high on a hill overlooking Union, New York. The operator is Freeman Bean, one of Spicer's men.



It was a 60 ft. well, finished in a slate formation which begins at a depth of 17 feet in that particular spot. The answer to the presence of gasoline in the well lay in the fact that directly across the road there is a filling station which, it was discovered, had a gasoline tank in which there had been a leak for some time. The gasoline had apparently drained into the rock formation and seeped through it into the well, probably because of loose pipe.

Spicer didn't drill this particular well, but he did drill one to take its place—60 feet away. This one was cased to a depth of 30 feet, and drilled to 82 feet, and the old one was cemented up. "There was no trace of gas in the new well, and days of unrationed motor fuel for this customer are over" Spicer added.

Drilling since 1930, Spicer handles a territory that covers the New York County of Broome and some of its neighboring counties, notably Dela-

ware, Chenango, and Tioga, all of which are located, roughly, in the Susquehanna River valley near the northern border of Pennsylvania.

About 40% of Spicer's wells are farm jobs, 50% more are suburban, and the remaining 10% are industrial. His farm and suburban wells are mostly 5-inchers averaging 100 feet in depth; the industrial wells are usually 6 inches in diameter, ranging in depth from 100 to 200 feet.

In Spicer's territory, the formations vary, both in character and depth. Hard pan, with plenty of boulder, is found commonly. It averages in depth about 70 feet, although some places it's only 10 feet deep while in others it goes down to 200. After the hard pan there is usually from 3 to 20 feet of sand, although near the banks of the Susquehanna and other rivers there is much more. Some of his wells are finished in this sand, but most of them go into the slate formation which can be found at depths varying from 20 to 200 feet. Interspersed in the slate are layers of sandstone varying in thickness from 3 to 8 feet.

In his fifteen years as a drilling contractor, Spicer has learned a lot of valuable things. One of them is to check into the site of a proposed well before going ahead with the deal. This was brought home to him on a job that he had at Sidney, New York, in 1935. Having accepted the job, he proceeded to transport his rig to the site—only to find that the well was to be drilled in a spot directly below a 40-foot bank with a 30° grade.

Sizing up the situation, Spicer devised a plan for letting his rig down safely: at the top of the bank there was a concrete road. Spicer drove two steel pegs on the far side of the road, running wire cable from the pegs over the axle for the 21-W's dual wheels. In this way he and his men let the rig down the bank safely, and got out the same way. Drilling of the well went along smoothly, and at a depth of 95 feet, the well

• Drilled at the foot of a steep bank, this well is being hand-pumped by operator Gerald Stanton. At extreme left is Guy Empet, the customer; beside him is Freeman Bean, a Spicer driller.

was finished in blue slate. A 5-incher, it delivered 5 gpm.

"A few years later," says Spicer, "we went all through the same thing again, drilling a well for the summer home next door." You can bet he knew exactly how to handle the situation.

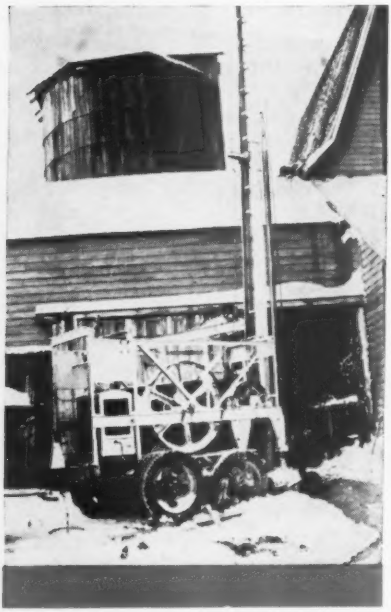
Among Spicer's toughest jobs was a domestic well at Owego, New York, in 1938. The job was to be drilled in an old 30-foot dug well, by the customer's preference. Spicer was willing to comply and went ahead with the job. At 90 feet they shot off the shoe and their troubles began.

Spicer and his men pulled the pipe and then put it back again, but found after repeated attempts, that they could not get past the shoe. So they pulled the pipe again, moved to the other side of the well and slanted the pipe in order to be sure to miss the shoe in the old hole. This plan worked out and they drilled ahead, striking rock at 100 feet. At 150 feet they found water with a flow of 1 gpm. Wishing to bring in a more plentiful supply, they drilled deeper, into limestone another 115 feet. There they brought in a good supply, so they put in the pump and moved away, believing their troubles over.

Not so. A week later Spicer received a distress call from the customer, saying that the water was salty—a fact which Spicer found hard to believe because he had tasted the water before he put in the pump.

However, the customer said it was salty and so it must be. Spicer hurried to the well, retasted it, and salty it was. He moved his rig back and pulled the drop pipe, finding that the last ten feet of it was black. The salt water, no doubt, having caused the blackness.

• In weather as cold as 10° below zero at times, this well was drilled at Norwich, New York in January, 1935. 125 feet deep, the well produced 10 gpm.



Water Fresh at Top

"We realized, now, why we did not know that there was salt in the well," Spicer relates. "You see, we took a few bailers of water off the top the day we installed the pump and this was fresh water. We hadn't taken out enough to reach the salt water."

To remedy the situation, Spicer tried taking off about 20 feet of the drop pipe. He found that this worked out as long as the well was only pumped moderately but that as soon as pumping was stepped up, the salt was again in evidence. So he took off the pump once more and put in a lead plug at 150 feet. This stopped the salt water but left the well with only a 1 gpm. supply, for which the customer was glad to settle, under the circumstances.

Spicer recalls another call — this

one at Endicott—which brought its share of difficulties, too. The trouble started when Spicer's men broke the drive pipe off 20 feet below the surface. To solve this problem, Spicer made a chisel out of tool steel welded to 2-inch pipe. Six-inch pipe was then run down to the 5-inch, providing a clear channel through which to use the improvised chisel. To cut the threads left in the coupling, the 2-inch pipe with chisel attached was driven with a sledge hammer.

This done, Spicer found the threads of the coupling so battered that it would not take an additional length of pipe. He got around this difficulty by cutting perpendicular slits into the end of the new length of pipe, and bending the pipe into a tapered end.

"Then I turned out a metal plug about five inches long," Spicer goes on, "that would just fit the pipe. This we drove down to expand the threads and hold the coupling until we pulled the pipe out. It worked, and we finally finished the job at 120 feet."

• This flowing well, 65 feet deep and finished in rock, flowed 8 gpm at ground level, with a rise of 30 feet above the ground. The operator is Fay Steele.

Water Has Odor

One of the funniest occurrences Spicer ran into was one involving a well whose owner called, complaining that "the water smells bad!" Spicer had drilled the well and was unable to guess why the odor existed. Investigation revealed that the owner had dug a ditch from the house to the well, installed a shallow-well electric pump, but had failed to fill in the ditch or cap the well.

"To make a long story short," Spicer smiles, "we bailed out 23 toads and 3 mice — which make a good reason for the smell!"

Questioned about bit-dressing, Spicer reveals that since February of 1944 he has been hard-surfacing his bits, using T.D. rod applied electrically. He uses on the average about ½ pound of rod per bit. Of performance with bits dressed in this manner, Spicer says: "They seem to wear a little longer and do not appear to get stuck in rock nearly as quickly. They drill faster, too, but chip in very hard rock."

Besides water well work, Spicer has handled a number of jobs for other purposes too. Among these was some blast hole drilling for the Tuckahoe Construction Company. The holes were 5 inches in diameter and 23 feet deep, drilled in hard pan. "Later on we also drilled some blast holes for the Town of Union. These were 17-foot holes in shale; they were used to blast out material for surface fill on dirt roads."

Spicer is not likely to be found on jobs of this type at present because

(Continued on page 12)

Geophysical Logging
of Water Wells in Northeastern Illinois

By

CARL A. BAYS, Geologist and Engineer

and

STEWART H. FOLK, Associate Geologist,

Illinois State Geological Survey, Urbana, Illinois

Editor's Note: *Material for this series is from a paper presented to the Western Society of Engineers and published in its Journal for September, 1944. These articles appear in THE DRILLER by special permission of the Western Society of Engineers and of the Illinois Geological Survey.*

IN the course of the Illinois Geological Survey's well logging program during 1942-43, logs were made of wells that ranged in age from some which had been drilled nearly half a century ago to some in which drilling was still in progress. Available records for the older wells were incomplete, unreliable, or lacking altogether, but for most of the newer wells there were carefully kept records and sets of cuttings that were studied in the Geological Survey laboratories.

The geophysical logs have afforded valuable information about all of them. In the newer wells they supplement the drillers' logs, geological studies, and engineering data in determining subsurface conditions that affect drilling and operation. By comparison and correlation of geophysical logs of wells for which there are no records with geophysical logs which have been successfully interpreted through integration with drilling, geological, and production data on their respective wells, formations present in the "unknown" wells can be identified, producing zones located, and other features determined. Geophysical logs are therefore helpful in guiding rehabilitation of old wells which is especially important now because of the shortage of manpower and materials for new construction.

Accurate determination of the producing zones for wells is made possible by running electric logs of various wells and correlating the results. Finding places of entrance of pollution and contamination is also facilitated by the geophysical logging methods used by the Illinois Geological Survey.

In addition to their value to men who are responsible for the drilling, maintenance, and operation of water wells, and consequently to the many individuals and industries dependent upon water from these wells, geophysical logs furnish a wealth of data that are of scientific value today and may prove of practical value tomorrow. This discussion, however, is limited to the results that repay the cost of geophysical surveys in dollars and cents to the well owner and his engineer or to the drilling contractor.

Identification of Producing Zones

That the Pleistocene sands and gravels, Niagaran and Galena lime-

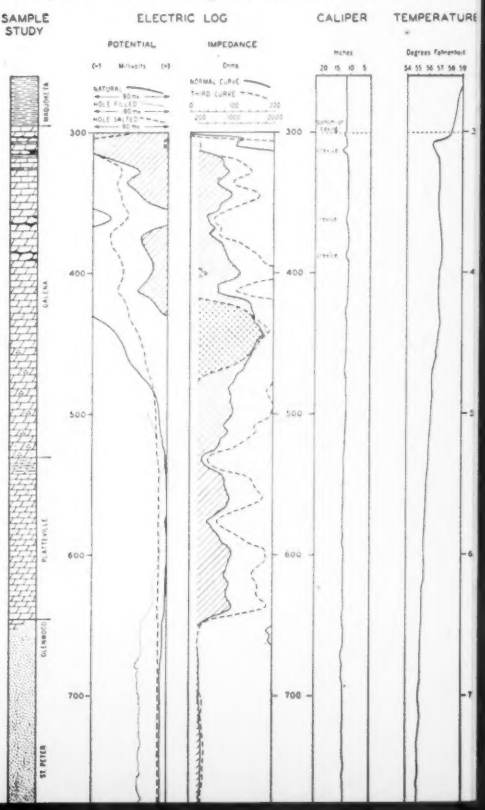
stones and dolomites, St. Peter, New Richmond, Galesville, and Mt. Simon sandstones are important aquifers in various parts of northern Illinois has been well known for many years. Fig. 1 shows a diagrammatic columnar section and composite electric log. But geophysical logging has revealed that in some wells there are other important aquifers, such as the middle limestone member of the Maquoketa formation, creviced portions of the Trempealeau dolomite, some parts of the Franconia formation, and some sandstones in the Eau Claire formation.

Correlations Big Aid

It has not been definitely known heretofore what particular zones furnish water in any one well, and of course each well is an individual unit, differing in some respects from all others. With geophysical logs the depths, thicknesses, and characters of producing zones and the principal factors influencing their yields in different wells have been determined. For example, geophysical logs have demonstrated that most water produced from the Galesville (formerly "Dresbach") formation comes from the lower 40 to 60 feet, the upper 100 or so feet of the formation being dolomitic and relatively impermeable. It had been supposed that the whole section was about equally productive. This and other productive zones in old wells for which there are no records can be located with geophysical logs through correlation with wells for which records and cuttings are available. Fig. 2 illustrates the correlation of two such wells.

With data now available, depths and thicknesses and relative yields of all aquifers in the incased portions of a well and any appreciable flow from behind the casing can be determined making a geophysical survey of that well. Two cases will illustrate the importance of this information. In one city in north Illinois the question arose as to whether or not enough water was produced from the Eau Claire formation to justify drilling the wells deep enough to penetrate it. From a geophysical survey it was determined that sandstone in the lower part of the Eau Claire in that area is both porous and permeable and is capable of furnishing large volumes of water. In another municipality a well that supposedly had been drilled through the Galesville, but for which the bottom-hole cuttings were not delivered to the Geological Survey, had a surprisingly low yield, too low to fulfill the local requirements. On correlation of the

Figure 1. Diagrammatic Columnar Section and Composite Electric Log for Northeastern Illinois.



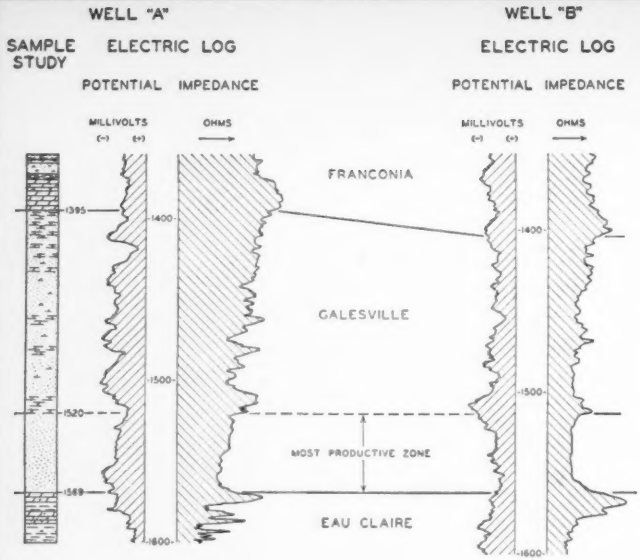


Figure 2—By correlating the electric logs of two wells, location of the most productive zones was achieved. This method eliminates conjecture, gives accurate information.

electric log of this well with that of a well a few miles away (see Fig. 3) it is evident that the well in question does not penetrate the lower part of the Galesville, which is by far the most productive part of the formation, and that a large increase in production may result by deepening the well by only 50 feet.

Sources of Contamination and Pollution

Widespread occurrence of pollution and contamination of wells by surface or near-surface fluids that

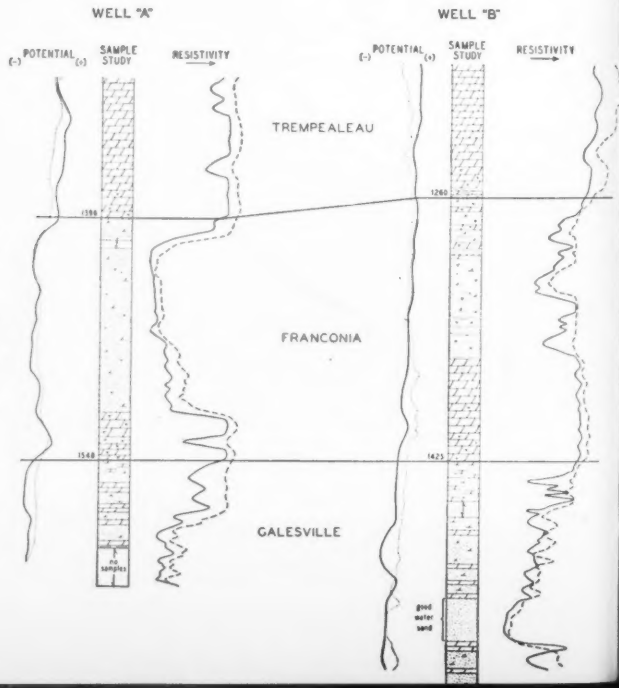


Figure 3—Correlation of portions of electric logs of two wells. By means of this correlation, it was determined that one of the wells did not penetrate the Galesville formation as had been supposed.

enter through holes in casing, through crevices below the casing, or by way of imperfect casing seats constitutes a menace to public health and increases treatment costs of water for both public and industrial use. The place of entrance of such waters can be detected and the conditions that permit their entrance be determined by the use of geophysical surveys, including temperature, current meter, and fluid-resistivity measurements in conjunction with electric logs and caliper logs. With that information available it is possible to determine what remedial measures—replacing the defective casing, reaming the hole to improve the casing seat or extending the casing below the creviced zone, and cementing—should be taken to eliminate the contamination or pollution.

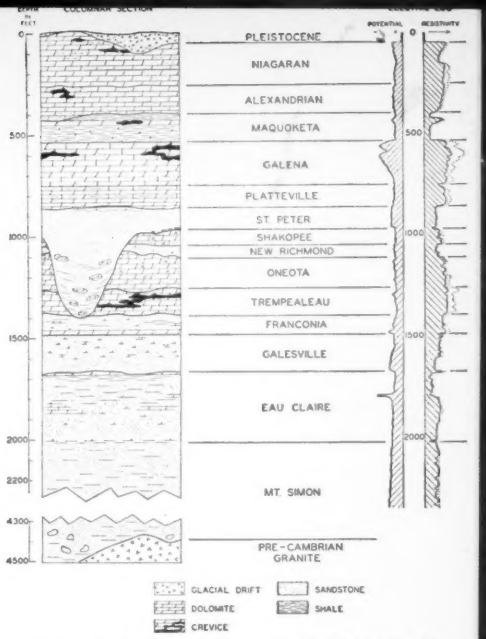


Figure 4. Portion of Composite Geophysical Log Used to Locate Source of Contamination.

Locate Casing Seat

Water from the well illustrated in Fig. 4 was unfit for use as either drinking water or boiler water in the ordnance plant by which it was urgently needed. The casing seat was located by the electric log and the caliper log. A 120-foot section of the dolomite under the casing was shown to be creviced, but high negative potentials indicated that water was leaving the hole through crevices. A distinct "cold" anomaly was recorded on the temperature log just under the casing seat, and inasmuch as the well was surveyed in warm weather and the fluid column in the casing was warm, this anomaly was interpreted as indicative of cold water from behind the pipe entering the well around the casing seat. When the current meter was placed just below the pipe it indicated water moving downward at such a velocity that the flow was about 200 gallons per minute. On the basis of the geophysical survey it was recommended that the hole be reamed down and the casing be set on a firm seat below the upper crevice zones and cemented to the top. All pollution and contamination was shut off by this working-over. Water from the well had been variable in composition and had necessitated considerable expense in treatment. By shutting off harder waters from glacial drift and the surface waters, a water of constant composition was obtained and treatment costs were greatly reduced.

Description of geophysical logging methods and the equipment used preceded the article in this issue (see THE DRILLER for December, 1944 and January, 1945).

The fourth article in this series will feature the location of "thieving" zones, casing and liners, "fish" etc. It will appear in an early issue.

The DRILLER

A JOURNAL FOR WATER WELL DRILLERS

Published every month by:
Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

Single copies 25 cents
Subscription price $1.00 per year
Canada and Foreign. $2.00 per year.

F. O. Wyse, Publisher
M. B. Jaeger, Editor
E. M. Heuston, Sales Manager

Consulting Editors
G. R. Watson **W. J. Walsh**

Address Communications to:
The Driller, South Milwaukee, Wis.

Vol. 19 February, 1945 No. 2

Support Your Association By Attending Meetings

IF you're one who has been active in his association you won't have to read this—*you* will attend the convention of your association because you have been doing so for years, knowing that only if you support the group can it be of any real value to you. On the other hand, you may be among those who attend state conventions rarely, if ever. In that case, this is for you, by all means.

The time when most state groups hold their annual meetings is here and chances are, if your state has an active organization and if wartime conditions will permit, that the meeting has been scheduled, a program drawn up, and details arranged.

The rest is up to you. The officials of your association can be counted on to line up speakers and program that will add to your valuable fund of drilling information; they can be relied on, also, to provide entertainment that will be pleasing. But they depend on you and your fellow drillers to come out in the numbers that will mark the conference as a success.

Participation Means Strength

The strength of any group can be judged pretty well by the number of persons who support it enthusiastically. Drillers' associations exist primarily to promote the welfare of the drilling contractor and his industry. By supporting your association you give it strength to help you and your industry.

By taking in your convention you'll have a chance to talk over your problems with fellow contractors, too. Cooperative effort often does much to produce solutions to difficulties that an individual finds baffling.

Plan now to attend *your* convention . . . you'll find it valuable!

Gasoline . . .

(Continued from page 7)

of the many water well jobs he has booked ahead—"We've got a good 6-months' work scheduled ahead," he explains. This is a tribute to his success, for he's at the point where looking for work is unheard of, all jobs coming to him via phone or in person.

He knows that good, reliable work is responsible for this and that he can keep it coming in by sticking to the business slogan that's always stood him in good stead: "quality work always!"

Pumping Water "the economical way"

The indisputable *economy of operation*, that is peculiarly a *Peerless feature*, is not just a happenstance. The ingenuity of top-notch engineers, the unusual skill of precision-minded, highly-trained pump building mechanics working with *better materials* plus years of painstaking laboratory and field tests alone were the factors responsible for not only the marked economy, higher sustained efficiency and greater dependability of every Peerless pump, but also the fact that Peerless products are from the factories of the world's largest manufacturer of deep well Turbine pumps.

Experienced Pump Engineers to Assist You

The Peerless Pump Distribution Organization, a member of which will be found in your near neighborhood, is composed of the most efficient and dependable pump men in the country today. Cooperating with our own factory-trained field engineers, they stand ready to offer you of their wide experience and skill.

PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corporation

TURBINE
HI-LIFT
HYDRO-FOIL

301 W. Ave. 26, Los Angeles 31, Calif. • 1250 Camden Ave. S.W., Canton 6, Ohio • *Other Factories:* San Jose 5, Fresno 16, Calif.

COUNTRY GENTLEMAN

YES! This Can Be Done with DELCO-LIGHT Equipment

At these amazingly low costs, you cannot afford to be without a Delco-Light Power Plant or Water System! Either will pay for itself many times over in time and labor saved. Reserve either or both for postwar delivery at your Delco Appliance dealer's today . . . and start saving *now*. You'll help yourself, help to curb inflation and help to make jobs after the war.

Free folders telling why and how Delco-Light Power Plants and Water Systems pay for themselves quickly on farms all over America, are yours for the asking. Simply write Dept. CG25, DELCO APPLIANCE DIVISION, General Motors Corporation, Rochester 1, N. Y.

Model CT-25 Delco Shallow Well Water System

★ SEND FOR FREE FOLDERS

DELCO APPLIANCE AT WAR

Delco Appliance War Products include Automatic Gun Directors, Marching Motors, Indicating Motors, Delco-Light Engine Generators, Aircraft Motorized Starters for specialized war tasks, Control Instruments such as Anschütz and Arma Switches, Solenoid Shifters and Overspeed Cut-Outs.

Buy War Bonds

GENERAL MOTORS
DELCO-LIGHT
Power Plants and Water Systems

Certain types of Delco-Light equipment are now available on priority.

This advertisement appears in the February issue of COUNTRY GENTLEMAN. It will be seen by hundreds of prospects living in your community.

Buy U.S. War Bonds

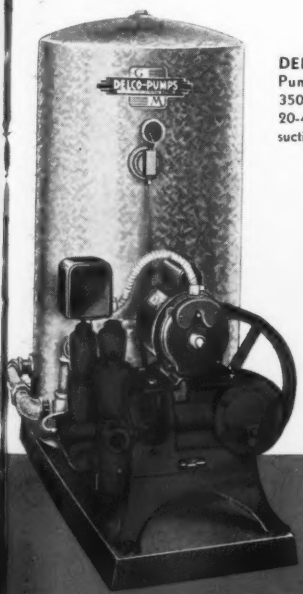
Ready for this Big Market!

DELCO Appliance engineers, research technicians and sales promotion specialists have figuratively rolled up their sleeves—getting set to take care of the greatest boom in water system sales since the thriving twenties.

In the pages of COUNTRY GENTLEMAN, we are currently telling and re-telling your prospects that DELCO Water Systems save time, save money, increase earnings and make country living more cheerful.

The enviable reputation of Delco Appliance for dependability, plus our extensive resources for research, plus coast-to-coast advertising coverage, add up to a winning combination working for you.

If you are a live-wire dealer and really want to hit pay dirt during the busy years ahead, get ready for this big market now. Inquire about a dealer franchise in your territory. For full details mail coupon below.



DELCO Shallow Well Pump, Model AA. 350 gallons per hour; 20-40 lbs. pressure; total suction lift up to 25 ft.

GENERAL MOTORS
DELCO WATER SYSTEMS

Mail This Coupon Today!

DELCO APPLIANCE DIVISION, Dept. D25
General Motors Corporation, Rochester 1, N. Y.

I am interested in your Plan for Dealers.

Name.....

Street.....

City..... *State*.....

NEWS OF THE MONTH

Illinois Drillers Meet Feb. 22-23

ILLINOIS water well drillers will hold their annual convention on February 22 and 23 at the Morrison Hotel, Chicago, according to word from L. E. Workman, service secretary for the Illinois Water Well Drillers Association.

Details for the meeting have not as yet been revealed as we go to press, but preparation of a sanitary code will probably be discussed, Workman indicates.

Dealer Calendar Issued By Deming

THE 1945 edition of The Deming Company's dealer calendar is now off the press, the manufacturer reports.

Illustrating their complete line of pumps and water system equipment, the new calendar is of 20" by 36" size. Cuts, giving detailed views of various Deming units, are shown on the calendar. Arrangement provides for easy location and ready reference.

Dealers may obtain copies of the calendar from The Deming Company, Salem, Ohio.

Demonstration Features Meeting Of Jersey Drillers

WITH more than 60 drilling contractors and operators in attendance, the New Jersey Water Well Contractors Association held another of its regularly scheduled meetings on December 18. The meeting was held at the Roger Smith Hotel in New Brunswick.

Featuring the meeting was an address and practical demonstration on the handling, heating, and dressing of drill bits by H. W. Huber, field engineer of Spang and Company, Butler, Pennsylvania.

That plans for meetings of a similar character for 1945 are now being made was indicated by M. L. Parkhurst, association secretary, of Verona, New Jersey.

New Tax Chart

A NEW withholding tax chart, giving deductions authorized under the revised tax law which became effective January 1, is now being offered by Delbridge Calculating Systems, Inc., 2502 Sutton Avenue, St. Louis 17, Missouri. The price is $2.50.

Published in four editions covering weekly, bi-weekly, monthly, and semi-monthly payroll periods, the chart is said to simplify calculating of tax deductions under the new law.

M. F. Rasmussen

The many friends of M. F. Rasmussen, Mapleton, Iowa were grieved to learn of his death on January 3 at St. Joseph's Hospital in Sioux City. One of six brothers, all of whom were active in the water well drilling industry, Mr. Rasmussen operated a well contracting business in Mapleton for 25 years. He is survived by his widow and one son as well as by five brothers and three sisters.

Badger Group Reorganizes

AT a reorganization meeting in Green Bay on January 6, the Wisconsin Water Well Drillers Association adopted a new charter and elected officers for 1945.

Officers elected were: R. J. Schafer, Fremont, President; E. A. Charles, DePere, Vice President; W. Rettela, Random Lake, Second Vice President; Raymond Johnson, Marinette, Secretary; Ben Karrels, Random Lake, Treasurer.

B. J. Garber, Milwaukee, conducted the meeting as temporary chairman. Officers indicated that announcements regarding future meetings will be made at a later date.

Dates Set For Indiana Meeting

THE 1945 meeting of the Indiana Well Drilling Contractors Association will be held in Indianapolis on February 22 and 23, Thursday and Friday, at the Spencer Hotel,

(Continued on page 26)

Nebraska Driller "Takes It Easy"

• Solid comfort! Driller Conrad Wegner of Stanton, Nebraska, rigged up an auto seat from which to manipulate the controls of this machine—one of 10 built by Wegner in his 32 years in the drilling business. In the left foreground is an attachment described by Wegner as a "rotor" for turning cable, as well as for screwing together pipe and casing. Built in 1927, the machine swings 1500 pounds of tools, holds 1000 feet of drill cable. In addition to his drilling business, Wegner conducts a contract machine shop.

FROM THE MAILBAG

This page is open to any of our readers having questions to ask relating to drilling, driving pipe, dressing bits, etc. All letters will be answered promptly by experienced drillers and engineers who are qualified to give intelligent advice on these subjects. We will publish as many letters of general interest as space will permit. Address: The Driller, South Milwaukee, Wis.

Sirs:

Do you have or do you know where I may find any books on drilling and handling and dressing of tools?

I am just about ready to begin drilling and have a lot to learn. I find great difference of opinion among drillers as to where to drill, the type of bits to use, etc. Can you help me?

L. A. H. Florida.

We do not have any book or manual telling how to drill wells nor do we know of any such book published anywhere.

In fact well drilling is one business that cannot be learned from books. There are too many varying conditions and contingencies to be covered successfully in any book or manual. The best way to get this information is by actual experience.

There are definite rules that should be followed in the selection of proper drilling tools, the best method of dressing bits, etc. This information is contained in a drilling tool catalog which was sent you recently.

Obviously some localities are more difficult to drill in than others, depending on local conditions. For instance the territory where considerable sand and gravel is encountered as a rule offers more risk and complications than territory where only rock is encountered. Different territories present different problems and the driller, in order to be successful, must be familiar with the conditions in the particular area in which he is drilling and must use the proper tools and employ the correct drilling technique for the conditions he has to meet.

There are good drillers and poor drillers in every locality and the success you have in this business will depend largely on your own efforts and knowledge. Success in this business, like in any other line, usually comes from long experience. You cannot expect to become a successful driller and learn everything there is to know about the business in a few months anymore than a man can become a professional baseball player in a couple of years.

Select Territory

The best way to do is to select a territory that you feel offers the best possibilities and then make it a point to learn all about the conditions in that territory, that is all about the underlying formation, location of water, proper methods of developing, etc. This information can usually be obtained from local drillers, based on wells that have been drilled in the same locality for years past. Much valuable information can also be obtained from your State Geological Survey Department. For instance, your State Geologist would be familiar with the formations in different territories and can doubtless be of valuable assistance to you.

Care must be taken to see that the sand and gravel does not heave in the pipe. This can be prevented by keeping the water close to the surface.

Sirs:

We have received some information that dry ice is used to clean out wells, as well as rejuvenate them or open up the old veins to increase the flow of the well; this being used in place of dynamite.

Can you give us any detailed information as to how the dry ice is used? What quantities are necessary for various sizes of wells and any other detailed information that you may have on this subject.

W. E. F. **Mass.**

The use of dry ice in well work is relatively new and as yet little is known about it. We do know that in a few instances dry ice has been used sucessfully in developing and reclaiming water wells but no definite technique has been worked out which will guarantee positive results in every case.

Dry ice chemically is carbon dioxide gas pressed into solid form. When dumped into the water in a well, the dry ice changes from solid form to a gaseous form rapidly and with considerable pressure which sets up a surging action in the well casing in the bottom of a well, thus forcing the water back and forth through the water bearing strata.

Increases Flow

It is particularly effective in a formation of gravels and clay. The surging action of the dry ice under pressure washes the clay away from the gravel and thus increases the flow of water through the gravel stratum.

As stated above, dry ice is still more or less in the experimental stage as far as using it for well work is concerned and we are not in position to say, without knowing your conditions, whether dry ice treatment for the wells you have in mind will be successful.

One thing, dry ice is relatively cheap and easy to obtain, therefore, it is worth a trial anyway. Care must be exercised in using dry ice, that is

(Continued on page 24)

For profitable shallow well drilling. "Hi-Lastic" lets the tools strike faster, harder blows. Keeps the bit turning better on all types of formation . . . helps reduce tendency for the hole to get out of round, and for the bit to channel. "Hi-Lastic" is internally lubricated. No manila cracker needed.

For profitable deep well drilling, use Macwhyte Standard Cable - Tool Lines. Just the right elasticity to strike long, hard, sharp blows.

For fast bailing, use Macwhyte Sand Lines. Coarse laid (6 x 7) or soft laid (6 x 19) . . . in mild plow steel grade.

ARMY NAVY

Get the CORRECT line for your equipment from No. 775

MACWHYTE COMPANY

2939 Fourteenth Avenue, Kenosha, Wisconsin, or any authorized Macwhyte Distributor or Mill Depot

The Driller & The Law

Clear Contracts Avert Difficulties

IT can never be impressed too strongly on drilling contractors that their best insurance against lawsuits or loss of their anticipated profits is an agreement in which the obligation of each party is perfectly clear and expressed in writing in terms which admit of no mistaken interpretation.

As if the truth of the statement is not self-evident, the next two cases are presented. In the latter the contractor got much less than he in all probability expected to make; in the former he collected—after eight years of waiting and litigation.

Contractor Sgarlat, an excavating contractor, had this experience which is equally applicable to drillers. As a subcontractor, he agreed with a contractor to excavate a specified area at a given rate, with the further provision however that "if rock be found which should *require removal by blasting*" it was to be paid for at a higher rate. Rock was found which it would prove advisable to blast but because of the proximity of buildings which might be damaged, Contractor Sgarlat decided that discretion dictated that the rock should be drilled out by use of a pack hammer despite the additional cost of the latter method. When he presented his bill to the contractor at the rate for "blasting" rock, he learned that the land owner was disposed to take advantage of the precise wording of the contract and refused to pay him at the rate agreed upon for removal of rock. After a period of considerable delay, suit was brought by the contractor who found that the trial court and the intermediate appellate court agreed with the landowner as to the interpretation. In the highest court to which the case could be carried, Sgarlat found a tribunal which applied these general rules to his case.

1. The contract was to be interpreted as a whole, and as such, called for extra compensation if rock was encountered.

2. Though the contract may have envisioned blasting, Sgarlat had rendered substantially what the contract called for by getting the rock out of the excavation by the means he employed.

3. Consequently any slight variation from the letter of the agreement which reduced the landowner's enjoyment could have been compensated for by a reduction in the total sum paid to him. Since in fact there was *no* reduction in the landowner's enjoyment he should be made to pay the full sum. (Sgarlat v. Griffith 36 A. 2d 330.)

Converts Well

In the second case *Koch* v. *Fishburn* 164 N.E. 721, a driller undertook to convert an open well to a drilled well at a specified cost per foot piping included.

The first hole was drilled in the center of the old well, but was abandoned at a depth of 35 feet when rock formation was encountered. The second hole was drilled at the side of the old well, but it was abandoned at 128 feet for the same reason. 112 feet of pipe was lost in that hole, because it could not be removed. The same fate befell 33 more feet of pipe in other holes. A third

hole and a fourth failed to get below 35 feet. Then the contractor told the landowner that it was not practicable to try to bring in a producing well. The latter had paid $9 but refused to pay any more, and Driller Fishburn filed a claim against the land under the Indiana Mechanics' Lien Law. He won his suit to hold the landowner liable and to enforce a lien against the land.

In its opinion, the Appellate Court said: "There was due and owing * * * on the agreement, $203." A computation shows that an allowance was made for drilling 145 feet, the number of feet that were cased in the several wells with pipe that could not be removed. (The total number of feet drilled in the four holes was 232, the deepest being 128 feet. Clearly if the driller had seen fit to raise the point, the court might have been confronted by the trouble-some question as to the basis on which the driller should be paid for every foot he drilled if not at the agreed rate for the number of feet drilled. The trial court allowed compensation for the number of feet in which the contractor could not recover the casing and the landowner alone appealed. Considering the opinion of the higher court as a whole, it would seem that a perfectly just award would have entitled the contractor to collect at the footage rate specified in the contract for the entire footage drilled, 232 feet, less a fair deduction to cover the cost of casing the 87 feet that were not left cased. Any other basis it would seem would be open to the charge that the court was making a contract for the litigants before it.

As in the case of *Littrel* v. *Willcox*, 27 P. 394, which was recently dis-

(Continued on page 24)

For information valuable to any driller about how to make water from a good well cheap and dependable, write . . .

JENSEN BROS. MFG. CO.

14th and Pacific Streets, COFFEYVILLE, KANSAS, U. S. A.

EXPORT OFFICE: 50 CHURCH ST., NEW YORK CITY, NEW YORK

WIT BITS

Professor: "Your pneumatic contrivance has ceased to function."

Bus Driver: "er—what?"

Professor: "I say, your tubular air container has lost its retundity."

Bus Driver: "I don't quite—"

Professor: "The cylindrical apparatus which supports your vehicle is no longer inflated."

Bus Driver: "But—"

Professor: "The elastic fabric surrounding the circular frame whose successive revolutions bear you onward in space, has not retained its pristine roundness."

Small Boy: "Hey, mister, you got a flat tire."

A soldier got a letter from his wife containing a sketch of their car's instrument panel. "This is the exact way the dashboard looks," she wrote. "Do we need a quart of oil?"

"Who you shovin'?"

"I dunno. What's your name?"

A lady friend of ours who has two sons in the Marines and a daughter in the WAC was recently visiting a farm when she came upon a youth of draft age milking a cow.

"Young man," she demanded sternly, "why aren't you at the front?"

"'Cause there ain't any milk at that end, ma'am."

"Crop failures?" asked the old timer. "I've seen a few in my day. Now in 1884 the corn crop was so short that we cooked some for dinner one day and grandpa ate 14 acres of corn at one meal."

Weather Man: "Put down 'rain' for today."

Assistant: "Are you sure, sir?"

Weather Man: "Yes. I lost my umbrella, I'm planning to play golf today, the roof has not been fixed yet, and my wife is giving a lawn party."

Sergeant: "Sambo, this is your sentry post. Stay right here and if anything moves, you shoot."

Sambo: "Yassuh, boss, an if anything shoots I move."

Voice on telephone: "My son has a severe cold and won't be able to come to school today."

Teacher: "Very well, sir, who is this speaking?"

Voice: "This is my father."

A little girl was seated on the front porch when the salesman approached the gate. He tried to open it but it stuck.

"Mother at home, little one?" he inquired before making further attempts to enter the yard.

"Yes sir, she's always at home," said the child. The agent jumped the gate and rang the doorbell. There was no response. He rang it several times more, and waited. The door remained closed. Somewhat vexed, he turned to the child and asked: "Didn't you say your mother was home?"

"Yes sir, and she is," replied the youngster.

"Then why doesn't she answer my ring, I wonder."

"I think she will, sir, when you reach our house," came the prompt reply. "We live four doors down the street."

Several years ago I drilled a deep well for a customer who bought a Deming Turbine Pump. I'd had experience with all the others but this was my first Deming.

Everything turned out fine. That Deming Turbine was the easiest to install of any I ever handled. The customer was so pleased he told all his neighbors. Several of them asked me to drill new wells and put in Deming Turbines . . . handle the whole job.

That started me selling Deming Pumps . . . not only turbines but all types. That complete Deming line makes it easy to select the exact type and capacity for any and every job . . . shallow well, deep well, and jet pumps too.

Of course, I'm still partial to that Deming Turbine. After all, it put me in the pump business and helped me build a bigger well drilling business.

DEMING

THE COMPLETE LINE

PUMPS AND WATER SYSTEMS

The Deming Company · Salem, Ohio

Mailbag . . .

(Continued from page 19)

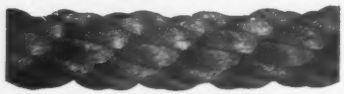
it should be kept in an air tight container until ready to put in the well and then heavy gloves or tongs should be used in handling to prevent burning or rather freezing the hands. Plenty of ventilation should be provided as the gas given off is suffocating if inhaled.

The best results will be obtained if the dry ice is broken up in small pieces. Ordinarily ten or 15 pounds of dry ice will create enough gaseous pressure and the operator can judge the proper amount to use. If feasible 25 to 50 pounds can be put into the well and the results observed.

Dry ice works better in deep wells with a considerable depth of water. Dry ice is the product of pure Carbonic, Inc., 60 East 42nd St., New York, N. Y. It can usually be obtained locally from wholesale drug houses, etc.

FITLER

COMMANDO BRAND SISAL DRILLING CABLE



for use in water well and blast hole drilling is especially constructed to give it plenty of spring and is lubricated against internal friction.

If your dealer cannot supply you—write direct for information.

THE EDWIN H. FITLER CO.
Established 1804
5625 Tacony Street
PHILADELPHIA 24, PA.

Driller and Law . . .

(Continued from page 21)

cussed in The Driller the real controversy centered about the question "What is a well?" which is implied in the two grounds on which the lawsuit was defended: (1) That the contractor did not earn the right to pay because he never completed a producing well. (2) That the mechanic's lien law did not allow a lien for drilling an uncompleted well.

The statute allowed a lien for "constructing, altering, repairing, or removing" certain designated things, including wells. Rejecting the contentions made by the landowner's lawyer, the Appellate Court said, in part:

"Bouvier—a law dictionary of recognized authority—defines a well as 'a hole dug in the ground in order to obtain water.' The object may not be attained, not that that does not prevent the hole so dug from being a well. The open or dug wells are, as a rule, a thing of the past. Instead of the dug well, we now have the driven or tubular well. If, in the instant case, appellee (the contractor) had dug a hole in the ground in order to obtain water, and on reaching the rock formation had abandoned the project, it could not be said he had not dug a well. The fact that he drilled the hole, instead of digging it, does not change the situation. Appellee in the instant case drilled four wells, and, under the agreement as set out in the complaint, was entitled to recover the agreed price from the" landowner. "There is no merit in the contention that the complaint does not allege

performance. He did not agree or guarantee to drill a well that would furnish water in any quantity or any quality."

So far as the opinion of the Indiana court shows, no question was raised as to the contractor's right to stop work in each of the four wells when he struck a rock formation. It seems to have been conceded by the landowner's attorney that it would have been futile to have drilled deeper in any one of the wells. But we do not believe that the decision in this case can be relied upon as authority for the proposition that a contractor who has undertaken to drill a well has a right to abandon a hole merely because rock is encountered, unless the contract so provides, or unless the landowner has guaranteed that no rock will be encountered. In other words it is a general rule that the mere fact that completing a well may entail more difficult drilling than was contemplated by the driller when he agreed to do the work would not excuse him from going farther, for courts hold that he is well able to protect himself by an appropriate provision in the agreement. Where local conditions make it likely that rock formation will be encountered, the advisability of inserting a clause in the contracts authorizing abandonment of the job or providing extra compensation is strong.

In our opinion, when a driller without the consent of the landowner, quits work on encountering rock formation, he should be able to point to a clause in his contract which justifies abandonment of the job, or should be able to prove that it was not practicable to drill through the formation or that existence of the formation conclusively proves that no water could be found at any reasonable depth.

Coming!
A SKY POWER
MOTORLESS
WATER SYSTEM
Millions of farmers have long awaited a running water system, complete on the farm and low in operating cost. Now comes the realization of that dream with the Monitor motorless water system.
Pressure controls will make the Monitor windmill fully automatic — pumping at night and while the family is away from home. A 1000-gallon tank or concrete storage reservoir will provide a reserve of cool running water.
Don't wait until after the war. You can start your sales campaign today. Install Monitor Sky Power windmills on the farms in your territory. When pressure tanks with Automatic Controls are available they can be attached to windmills you sell now, thus assuring you of a profitable follow-up business.
Now is the time to start getting your share of the sales.
Monitor
SKY POWER WINDMILL WATER SYSTEM
THE Monitor LINE
DEEP WELL WATER SYSTEMS • WINDMILLS • HAND PUMPS • PUMP JACKS • ENGINES • WATER WELL SUPPLIES
• BRANCHES •
BAKER MFG. CO.: Minneapolis, Minn.; Madison, Wis.; Fort Dodge, Ia.; Cedar Rapids, Ia.; Omaha, Neb.; Kansas City, Mo.; Enid, Okla.; Hutchinson, Kansas
BAKER MFG. LTD., Winnipeg, Canada
AFTELL CO.: Fort Worth, Tex.; Amarillo, Tex.; Lubbock, Tex.; San Angelo, Tex.
BAKER MANUFACTURING CO., EVANSVILLE, WIS.

BARGAIN COUNTER

To the reader who wishes to advertise used equipment in "Bargain Counter" Section. All advertising in this section is payable in advance. Enclose your check or money order with copy. Rate: 30c per line. Minimum charge $1.20. No discounts; no commissions. Read these instructions carefully. The average line contains 28 characters (20 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number if blind advertisement is desired. Count your own copy to save delay. Holding up your advertisement one month to secure approval of revised copy or an additional remittance, may cost you real money in a lost sale. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example—January issue closes December 10th.

To the reader wishing to answer "Bargain Counter" Section advertisements appearing on these pages: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of THE DRILLER, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

DRILLS

Sparta 30 drill, truck mounted, with or without tools. Keystone 5½ drill, semi-trailer on rubber, new 50' derrick. Located in Minnesota. Box 0412

WISCONSIN — Sparta Drill 300'-500' capacity, wood frame, 33' derrick with shock absorber. LeRoi 2 cylinder gasoline engine, solid tired semi-trailer mounting with Ford truck. Located near Milwaukee. Price without tools, $700.00.
Box 4911

For Sale, Well drill and complete tools. Mrs. John Kovack State Highway 9-W, Tomkins Cave, New York.

MISC.

For Sale $250.00

Mills perforator, combination 10", 12", and 14" 6 factory blades. 1 16" spider and slips, 13" ring. 1 16" Wilson elevator. 1 16" drive head, 1 13" Wilson elevator. 1 13" oil well (light elevator). 2 13" drive heads. 2 set tool wrenches 3½" and 4½" square. 1 Circle, jack and post. 1 8⅝" side latch elevators. 2 8" side latch elevators. Set Michlien temper screw clamps. 1 6" bit 5', 2¼ x 3¼ pin. Bit gauges, 16", 13", 10". 1 4" drive head. 1 12" OD, Larkin drive shoe 11½ thread. Dozen casing couplings and thread ends 16" to 6". All tools listed above for $250.00 F.O.B. J. Hy. Petersen, Box 582, Bountiful, Utah.

Slightly used string of drilling tools in good condition, including socket, jars, stem and bit; 2¾" straight pins, stem 9'6" length, bit 3' length all necks 4". Price $140.00.
Box 0422

WANTED

Wanted — Armstrong No. 35-W or Bucyrus-Erie 21-W or 33-W drill. Machine must be in good condition. Please advise location, equipment included and price. Box 4612

Used well machine in good condition. Bucyrus-Erie 21-W, 33-W, or Armstrong 35. Please include information on price, equipment included, location of machine. Box 0432

HELP WANTED

Experienced Driller Wanted

Experienced, water well, 6 and 8 inch holes. Steady work. $1.25 an hour, as many hours as you desire. Write giving experience and reference.

Tasker Water Wells
121 S. Kingsboro
Gloversville, N. Y.

Several well drillers . . . $1.25 per hour. Box 0591

Drillers for Overseas

Experienced cable tool operators for New York firm. $2.04 per hr., time-and-half for over 48 hrs. Living Costs $50 per month. Age limit 45. Physical examination and draft board approval required. Box 0442

Indiana . . .

(Continued from page 17)

according to E. H. Merritt, association secretary.

Large attendance at the meeting is anticipated, Merritt indicated. Discussion regarding a proposed licensing bill to be put before the Indiana legislature will probably highlight the meeting, Merritt said.

Details of the program for the two-day meeting have not yet been announced. As in years past, a complete program booklet will be published, it was revealed.

"Why do you raise hogs instead of corn or cotton? Do they pay better?"

"Nope, but hogs don't need no hoein'."

The same field-proved effectiveness that marks every Bucyrus-Erie product, makes Bucyrus-Erie drilling and fishing tools outstanding for speedy performance on your water well work. Made from carefully selected long-service steels, these time-tested tools incorporate the expert designs and workmanship developed by long experience and proved efficient and dependable in many years of service.

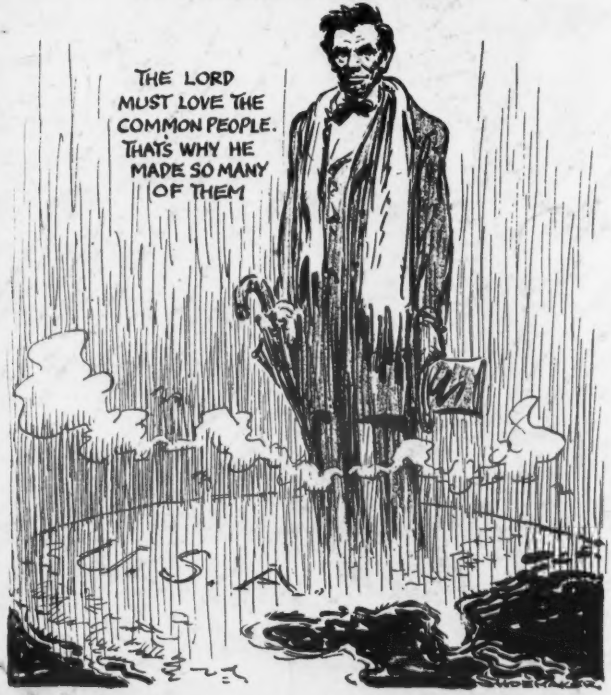
Try Bucyrus-Erie drilling and fishing tools on your work — the results you get will convince you that they're essential.

M-13C

BUCYRUS-ERIE CO.

If undelivered to new address, notify sender on form 3547.
Postage for notice guaranteed.
Return and Forwarding Postage Guaranteed
The Driller, South Milwaukee, Wisconsin

"WITH MALICE TOWARD NONE"



Courtesy Appreciate America, Inc.

DRILLER
A journal for water well drillers
SO. MILWAUKEE WIS. U.S.A.
U.S. POSTAGE
PAID
PERMIT No. 3

The John Crerar Library,
86 East Randolph St.,
Chicago, (1)
Illinois.

If forwarded to new address, notify sender on Form 3547.
Postage for notice guaranteed.
Return and Forwarding Postage Guaranteed
The Driller, South Milwaukee, Wisconsin

DRILLER
A journal for water well drillers

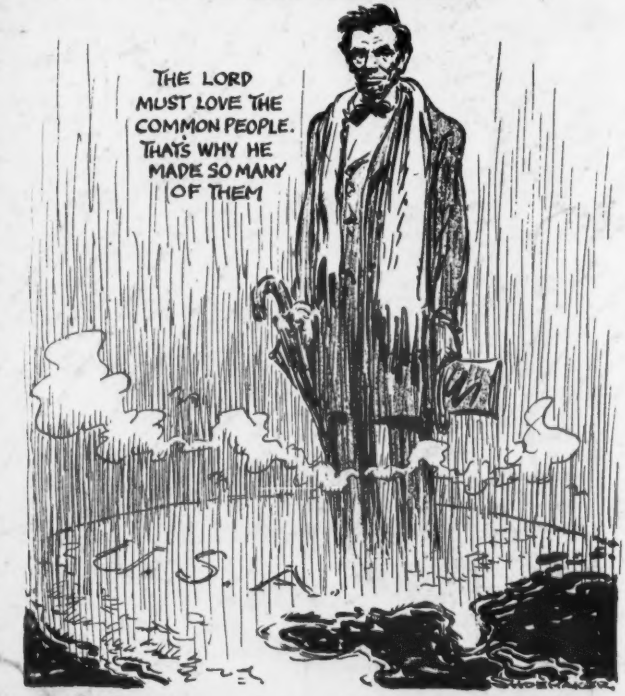
U.S. POSTAGE
PAID

If undelivered, forwarded to new address, notify sender on form 3547.
Postage for notice guaranteed.
Return and Forwarding Postage Guaranteed
The Driller, South Milwaukee, Wisconsin

DRILLER
A journal for water well drillers

SO. MILWAUKEE WIS. U.S.A.
U.S. POSTAGE
PAID
PERMIT No. 3

"WITH MALICE TOWARD NONE"



Courtesy Appreciate America, Inc.

The John Crerar Library,
86 East Randolph St.,
Chicago, (1)
Illinois.

If forwarded to new address, notify sender on form 3547.
Postage for notice guaranteed.
Return and Forwarding Postage Guaranteed
The Driller, South Milwaukee, Wisconsin

DRILLER

A journal for water well drillers

U.S. POSTAGE
PAID